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High-Temperature Nickel-Brazing Alloy

A brazing alloy for nickel, with a brazing-temperature range from 1680° to 1720°F, has been developed and used for brazing of nickel-clad silver electrical conductors which operate at temperatures to 1200°F. The alloy is composed of 77.9% gold and 17.1% nickel, with 5% indium added to depress the melting point.

The alloy was developed for brazing together the ends of nickel-clad silver stator coils in an electromagnetic boiler-feed pump which operates with a hot-spot temperature of 1200°F. This application required that the brazed joint have both adequate strength and stability at the operating temperature, and electrical conductivity comparable to that of the conductors. The operating environment prohibited the presence of silver either in the brazed joint or on open surfaces within the pump. Therefore the brazing alloy could not contain silver, and the brazing temperature was kept below the melting point of the conductive silver cores to prevent alloying with the braze metal. To prevent corrosion by residual flux, no flux was used.

A review of brazing alloys and techniques indicated need for a gold-based brazing alloy and that brazing must be done in an inert-gas atmosphere. Available gold-nickel alloys met the requirements except for their high melting points. A review of additives for depression of melting points resulted in the selection of indium. Indium has good solubility with both gold

and nickel, and the liquidus temperatures of the gold-indium and nickel-indium binary systems can be substantially reduced by small increases in the indium content. The low content of indium in the selected brazing alloy minimized the effect of indium's high vapor pressure.

This brazing alloy may be used in high-temperature electrical systems in lieu of conventional gold-nickel, gold-copper, or silver brazing alloys; it has low electrical resistivity, does not require a flux, and is less corrosive than other gold-nickel and gold-copper alloys.

Note:

No additional documentation is available. Specific questions, however, may be directed to:

Technology Utilization Officer
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No patent action is contemplated by NASA.

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